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Third, all our activity was turned toward urgent (chronic limb-threatening ischemia, symptomatic carotid stenosis, and aortic aneurysm >5.5 cm) and emergent patients. Whenever possible, we opted for an approach that shortened the length of stay: endovascular aneurysm repair, percutaneous approach, and use of local or regional anesthesia.

In the hospital, wards were divided into three types: triage (waiting for a SARS-CoV-2 result) and COVID-19 or non-COVID-19 wards. The same was done for ICUs.

As a measure to increase the ICU capacity, the vascular surgery ward was turned into an ICU to COVID-19 patients, which led us to reformulate the entire Heart and Vessels Department. In general, the noninfected vascular surgery patients are admitted in cardiothoracic surgery wards and infected patients in the cardiology wards.

The operating rooms were also divided into SARS-CoV-2-positive rooms, where full protection equipment is used, and SARS-CoV-2-negative rooms. Patients had to be asymptomatic and to have a negative test result to be operated on in the SARS-CoV-2-negative operating room. Emergent cases were assumed to be positive, and the recovery period took place in a triage ward or ICU until a test result was present.

So far, we have seen a significant decrease in the number of vascular urgent cases and even emergencies, which is probably due to the population confinement measures (reducing trauma, for example) and to patients being afraid to go to the hospital. There is a huge concern that after the crisis, we may end up with advanced stages of vascular diseases, like higher degrees of unsalvageable limbs.

So far, we have been able to maintain an active practice and to treat all urgent and emergent cases and have had no infections among our staff.

Some questions are now emerging regarding the true future impact of the pandemic state:

1. What will be the outcome of vascular patients who develop COVID-19?
2. What is the real impact on the outcome of elective patients who are being systematically postponed because of the current pandemic, and how will we be able to treat them in the future and at what cost?
3. Can the public health system accommodate the impact cost, and will we be able to deliver the same clinical standard of care to the huge number of patients who have seen their treatment postponed or canceled?
4. How will the weaning period be processed? What will be the right time to dismantle the ICUs and

recover the vascular surgery ward to return to normal activity (can a short relapse of the pandemic state be predicted)?

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## Perspectives on vascular surgical practice change due to COVID-19 at a nonacademic tertiary care center



The 2019-novel coronavirus (COVID-19) has overwhelmed healthcare systems across the world, and has also affected specialized practices such as vascular surgery. The first case in the United States was diagnosed on January 19, 2020. This prompted many healthcare systems, including our institution, to initiate preemptive measures in preparation for the anticipated surge of patients. The first case in Minnesota was diagnosed on March 4, first death on March 21, and the projected daily death peak is April 26.<sup>1,2</sup> Recommendations on social distancing from the Centers for Disease Control and Prevention as well as the subsequent state-wide stay at home order in Minnesota, are aimed at slowing viral spread and providing more time for hospital preparation for the surge.<sup>3,4</sup>

In light of these recommendations, we instituted drastic changes to our clinical practice on March 23 in accordance with the American College of Surgeons COVID recommendations for elective procedures.<sup>5</sup> This process involved postponing all elective procedures, with the exception of those deemed necessary for immediately life- or limb-threatening conditions. Each case that has subsequently been performed has required independent review and approval by leadership from our section. To ensure postponed procedures are not

overlooked in the future, a database has been developed and is maintained prospectively at the time of case rescheduling. The majority of outpatient visits have also been transitioned to virtual visits with phone conversations, chart review, and limited imaging to protect clinic personnel. To better understand the implications of this practice change, we reviewed all cases scheduled to occur within the first 16 days after its institution.

A total of 46 elective procedures were scheduled between March 23 and April 8, with 43 cases (93%) being rescheduled or postponed. This included 16 outpatient vein procedures (37%), 5 patients with claudication (12%), 3 aortic aneurysms (7%), 2 with critical limb ischemia (CLI; 5%), and 2 asymptomatic carotid stenoses (5%). Of the patients with CLI, one had a slow-healing small toe wound and one had stable rest pain. One patient with carotid stenosis and a recent transient ischemic attack was postponed for only 2 weeks while new practice protocols were being established.

Eighteen procedures were performed during this period, including 10 already hospitalized (56%) and eight nonhospitalized (44%) patients. All nonhospitalized patients required postoperative admission, with only one requiring continued mechanical ventilation after explantation of infected aortic graft and allograft reconstruction. Indications for surgery performed on hospitalized patients were wound/fasciotomy management in 4 (40%), CLI with tissue loss in 3 (30%), the need for extracorporeal membrane oxygenation decannulation in 2 (20%), and symptomatic carotid artery stenosis in 1 (1%). Indications for nonhospitalized patients were CLI with infection/gangrene in 2 (25%), wound complications in 2 (25%), and 1 case each for aortic graft infection, ruptured aortic aneurysm, symptomatic carotid artery stenosis, and subacute arm ischemia.

The COVID-19 pandemic has considerably altered the current practice of vascular surgery, including in areas that have not yet seen a surge in cases. Although we still currently have capacity to perform urgent/emergent procedures, we must anticipate a progressive scarcity in resources that may limit this capacity during the impending surge.

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## Strategies and recommendations for the safe implementation of vascular surgery during the pandemic period of novel coronavirus pneumonia



At present, the prevention and control of the new coronavirus pneumonia (World Health Organization term, COVID-19) pandemic is at a critical time. As of April 7, 2020, more than 1.2 million cases of COVID-19 infection had been confirmed,<sup>1</sup> with 588 confirmed cases of COVID-19 infection in Beijing.<sup>2</sup> How to manage vascular diseases properly and at the same time strictly prevent and control the pandemic represents a serious new challenge for vascular surgeons. The aim of our study was to assist our colleagues in the clinical practice during the coronavirus disease outbreak.

Since the first-level response mechanism for public health emergencies was initiated in Beijing, our department has promoted the hierarchical medical system for outpatients and emergency patients according to the recommendations provided by the American College of Surgeons.<sup>3</sup> During the pandemic period (January 24, 2020 to March 20, 2020), 53 emergency or semielective surgical procedures were performed in our department (Fig).

In the selection of surgical methods, we have preferred endovascular surgery. Most vascular diseases can be treated by open surgery or endovascular surgery, and the latter will usually have the characteristics of less surgical trauma, a shorter operative time, and a shorter hospital stay. During the pandemic, because open surgery and endovascular surgery would provide similar results, we have chosen to perform endovascular surgery as much as possible. Only 4 of our 53 operations used an open approach (1 abdominal aortic pseudoaneurysm repair and 3 femoral artery thrombectomies), with the remaining all endovascular. We sought to perform the surgery using femoral artery access, which can increase the distance between the surgeon and the patient's respiratory tract. For anesthesia, our